

Book Reviews

Natural and engineered pest management agents. ACS Symposium Series No 551, ed. P. A. Hedin, J. J. Menn & R. M. Hollingworth, American Chemical Society, Washington DC, 1994, xvi + 552 pp., price: US\$ 109.95. ISBN 0 8412 2773 X

This book is developed from the conference with a similar title sponsored by the ACS Division of Agrochemicals, Snowbird, Utah, 9–14 August, 1992.

Thirty-seven papers on diverse aspects of this subject are presented in five sections: (1) Natural product pesticides, (2) Peptides and neuropeptides, (3) Natural and engineered viral agents, (4) Evolving approaches to pesticide discovery: biochemistry and computer-aided design, (5) Registration of biopesticides.

The interest in natural products as leads to new structures continues, reinforced by environmental considerations and refreshed by the recent development of the *beta*-methoxyacrylate fungicides. In section (1) a wide-ranging review by Nakanishi on the isolation and chemistry of natural products ranging from phytoalexins through brassinosteroids to insect antifeedants, ecdysteroids and spider venoms follows the editors' overview of prospects for the next century. Subsequent papers demonstrate the value of research on microbial metabolites, as represented by the diabroticins; pyrazines active against southern corn rootworm; an up-date on avermectin research; and new herbicidal antibiotics. Comprehensive reviews on the chemistry and activity of the *beta*-methoxyacrylates, brassinosteroids, azadirachtin and ryanoids, together with shorter papers with more emphasis on sources and bioassays, complete this section.

Section (2) introduces a shift from 'classical' natural products studies into new realms revealed by advances in technique, especially molecular biology. Peptides affect essentially all aspects of organismal development, function and reproduction, and new leads for weed, fungus and insect control may arise from studies on their action. Venoms isolated from insects and spiders are used to explore the properties of ion channels, research which may suggest new chemicals for insect control. Sex peptides regulate insect reproduction;

advances in delivery technology may permit their practical use in due time. Other peptides regulate such things as development, eclosion and diuresis, and in some cases more stable and/or more easily deliverable synthetic analogues may emerge. The fungus-derived cyclic tetra-peptide tentoxin, with herbicidal properties, and iturin, a peptide fungicide from *Bacillus subtilis*, suggest the possibility of biorational control of weeds and fungi with peptides, although there are problems of economic production, as with many such microbial products.

Section (3) begins with papers on insect control with nuclear polyhedrosis (NPV) and granulosis viruses (GV) and continues with examples of attempts to accelerate their action, which generally allows larval feeding to continue until death. Many problems remain but recombinant DNA technology has been used to engineer modified viruses that, in addition to their intrinsic viral activity, mediate the expression of insect neurohormones, toxins or enzymes such as juvenile hormone esterase, in the host. The final paper in this section addresses the problems of formulating viral products to ensure sufficient stability for efficacy under environmental conditions.

Section (4) deals with various rational approaches, such as molecular design based on QSAR, inhibition of critical enzymes, and knowledge of critical receptor topology. Fujita and colleagues describe EMIL, a system for computer-aided structure transformation of bioactive compounds. There is a detailed analysis of approaches to herbicide discovery through enzyme inhibition and a paper on the use of mutants to explore the effects of known amino-acid changes on herbicide binding to the D1-protein in photosystem II of *Chlamydomonas reinhardtii*. The associated changes in sensitivity to these compounds are discussed in terms of their fit to a model of the binding niche.

Biopesticides have regulatory problems of their own, and special regulations apply to the products of recombinant DNA technology. The five papers in section (5) address various aspects of this subject, from registration to problems of the application of the US Environmental Protection Agency good laboratory practice regulations

to field studies. There are author, affiliation and subject indexes. The editors have done a creditable job in assembling this volume derived from conference contributions. Individual chapters are well referenced to 1992/1993 and I am pleased to have it on my shelves as an information source on progress in this challenging area.

G. T. Brooks

Bioremediation through rhizosphere technology. ACS Symposium Series No 563, ed. Todd A. Anderson & Joel R. Coats, American Chemical Society, Washington DC, 1994, xii + 249 pp., price US\$59.95. ISBN 0 8412 2942 2

Plants growing on contaminated land may assist in bioremediation of soil contaminated with organic compounds and this topic is receiving increasing attention. This book is part of the Symposium Series of the American Chemical Society and contains 17 contributions divided into the following four subtopics: rhizosphere technology, interactions, industrial chemicals and pesticides. The subject is about matching distributions of contaminant chemicals in the soil profile to distributions with depth in soil of microbial populations, which themselves depend on the distribution of plant-root densities. Greatest root density occurs near the soil surface, with often an exponential decrease with depth which will tend to match the distribution of only those chemicals that are strongly sorbed and not leached deeply. Clearly the plant species and the microorganisms that assist in the degradation of the contaminant need to be tolerant to the contaminant chemicals at the concentrations found in the soils of interest. Several articles in the book show that populations of microorganisms are enhanced by the presence of plant roots, but this alone is insufficient because only a small proportion of the microorganisms are likely to participate in the biodegradation of the contaminant. However, the topic is perhaps at a still too early stage of development to justify a review of this type because there seems very little indication of an established rational and structured approach to the subject in most of the papers, despite the worthy efforts of the editors to organise the ordering of the contributions. Nevertheless, a few of the articles will be of value to those interested in this topic.

P. Nicholls

Advances in the chemistry of insect control III, ed. G. G. Briggs, Royal Society of Chemistry, Cambridge, UK, 1994, vi + 250 pp., price £47.50. ISBN 0 85186 992 0

This monograph, the third in the series, reproduces in 18 chapters many of the lectures presented at the joint RSC Fine Chemicals and Medicinals Group and SCI Pesticides Group Symposium held in Cambridge in July 1993. The chapters are written by international experts in insecticide chemistry, each reporting the state of the art in their respective fields. Three themes are covered in this volume: new approaches; new leads and structure optimisation; and natural product synthesis. There are equal contributions from researchers in the crop protection industry with those from universities and research institutes. It is interesting to contrast the subjects studied by each source: industry authors all focus on key synthetic strategies utilised in their lead discovery and optimisation programmes, presented together with sufficient biological information and structure-activity trends to put these in context, whereas the chapters written by academicians cover a diverse range of approaches with emphasis on natural products. The chemistry involved in the exploitation of several new insecticidally active classes of compound generally discovered by random screening is reported, alongside current work from more established fields such as pyrethroids and avermectins.

Four chapters are devoted to pyrethroids; two each on 2-arylpyrroles and avermectins; and one each on rotenoids, antifeedant drimanes, fenazaquin, pymetrozine, GABA antagonists, 3-aryl pyrimidinones, as well as studies on other natural products synthesis and plant proteinase inhibitors. The book maintains the high standard set by earlier volumes in this series and provides a valuable insight into some of the recent advances in the quest for novel agents able to control insect pests. I believe that pesticide chemists will find this volume essential reading, and that it will be a useful addition to the shelves of both industrial and academic chemistry libraries.

D. W. Hawkins